

NON-PUBLIC?: N  
ACCESSION #: 9305040013  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Point Beach Nuclear Plant, Unit 2 PAGE: 1 OF 7

DOCKET NUMBER: 05000301

TITLE: Reactor Trip During Turbine Trip Testing  
EVENT DATE: 03/28/93 LER #: 93-002-00 REPORT DATE: 04/27/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
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Operations Manager

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

#### ABSTRACT:

At 0145 CST on March 28, 1993, while Unit 1 was shut down for its Cycle 20 annual refueling outage and Unit 2 was operating at 100% power, a Unit 2 reactor trip occurred during performance of Technical Specification Test TS-4A, "Turbine Trip Test (Monthly), Unit 2." A Duty Operating Supervisor (DOS) was directed by the Duty Shift Superintendent (DSS) to conduct Test TS-4A. The DOS then assigned one Licensed Auxiliary Operator (LAO) to assist him in performing the evolution. Test TS-4A cautions the operator to hold the turbine test handle in the "TEST" position during the entire test to prevent an actual trip from the mechanical trip block devices. However, due to valve operation difficulties and subsequent follow-up actions, the LAO commenced opening thrust bearing Hand Valve 2EH-00065 before the DOS was able to hold the turbine test handle in "TEST." Pressure in the test line increased to the turbine trip setpoint and, because the test handle was not in the "TEST" position, the turbine stop valves shut and the turbine tripped, resulting

in a reactor trip. The test was immediately terminated. Operations personnel entered Emergency Operating Procedure EOP-0, "Reactor Trip or Safety Injection." Unit 2 was subsequently returned to full power at 2220 CST on March 29, 1993. A 4-hour notification to the NRC was made at 0401 CST in accordance with 10 CFR 50.72 (b) (2) (ii).

END OF ABSTRACT

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#### EVENT DESCRIPTION

At 0145 CST on March 28, 1993, while Unit 1 was shut down for its Cycle 20 annual refueling outage and Unit 2 was operating at 100% power, a Unit 2 reactor trip occurred during performance of Technical Specification Test TS-4A, "Turbine Trip Test (Monthly), Unit 2." A Duty Operating Supervisor (DOS) was directed by the Duty Shift Superintendent (DSS) to conduct Test TS-4A. The DOS then assigned one Licensed Auxiliary Operator (LAO) to assist him in performing the evolution. After determining that the first portion of the procedure (the turbine overspeed trip test) would not be conducted, they proceeded to the next portion of the procedure which tests the turbine thrust bearing trip. The procedure provides allowances for waiving performance of the turbine overspeed trip test if certain initial conditions are met.

Test TS-4A cautions the operator to hold the turbine test handle in the "TEST" position during the entire test to prevent an actual trip from the mechanical trip block devices. The turbine test handle is mounted on the protection block located on the governor pedestal base. The DOS decided that he would maintain communications with the control room and monitor the turbine trip lever position. The LAO would operate Test Valve 2EH-00065 (which is also located on the turbine protection block), hold the test handle in the "TEST" position, and observe the test line oil pressure when the DOS indicated that the trip lever had rotated to the "TRIP" position.

As they commenced the evolution, the LAO placed the test handle in the "TEST" position and he attempted to open Test Valve 2EH-00065. However, the valve was difficult to operate. The LAO rotated the handwheel 1/4 turn open and did not observe an increase in oil pressure as expected. The LAO believed the valve stem had turned 1/4 open, when in fact only the valve handwheel had turned. The LAO then returned the valve to its original position and he released the test handle.

After discussing the situation, both the LAO and DOS believed that the valve was stuck and a wrench would be needed to assist opening it. The

LAO thought that the stem and disk were two separate pieces and the 1/4 turn he had experienced was due to the play between the stem and the disk. Thinking he could rotate the valve stem 1/4 turn open before moving the valve disk, the LAO rotated the valve stem using a wrench and then repositioned the wrench on the stem so that he could crack open the valve slowly to perform the test. When the LAO unexpectedly rotated the valve stem, the DOS attempted to place the test handle in the "TEST" position. However, the DOS could not position the test handle quickly enough; the test line pressure increased to the trip setpoint and the turbine stop valves shut. As a result, a Unit 2 turbine trip and reactor trip

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occurred at 0145 CST on March 28, 1993. The test was immediately terminated. operations personnel entered Emergency Operating Procedure EOP-0, "Reactor Trip or Safety Injection."

When Unit 2 experienced the reactor trip, Unit 1 had been shut down for its annual refueling outage and Kewaunee Nuclear Power Plant (KNPP), located five miles north of Point Beach, was shut down for its annual refueling outage. As a result of the three large generating units being shut down, a reduced grid voltage condition was created. Shift operating personnel began monitoring grid voltage and steps were taken to improve the situation. However, at no time were automatic protection features challenged or manual protection actions required.

Subsequent to this event, the desirability of performing additional surveillance testing which could further jeopardize grid stability was assessed. Due to off-site power reliability concerns created by a possible single unit trip during testing, NRC enforcement discretion was requested to allow a one time, 30-day extension to monthly surveillance tests for certain reactor protection and engineered safeguards system instrumentation. This would allow the tests to be conducted within two weeks of the return to full power of either KNPP or PBNP Unit 1 following their annual maintenance and refueling outages, but no later than May 13, 1993. This request was formally approved by the NRC Office of Nuclear Reactor Regulation (NRR) on April 15, 1993.

Unit 2 was subsequently returned to full power at 2220 CST on March 29, 1993. Because this event involved an actuation of the reactor protection system, a 4-hour notification to the NRC was made at 0401 CST in accordance with 10 CFR 50.72 (b) (2) (ii).

EQUIPMENT DESCRIPTION

One function of the turbine lube oil system is to provide operational control of the turbine generator unit in conjunction with the electro-hydraulic control (EHC) system. The two systems are separate and individual, but are interlocked through an interface emergency trip valve.

The thrust bearing trip device is designed to shut down the unit when thrust bearing trip control pressure rises to approximately 80 psig. This device warns the operator of excessive rotor movement in the axial direction and shuts down the unit if the axial movement increases to the point where serious damage to the turbine could occur. The device consists of 2 small nozzles which have discharge openings close to the thrust collar faces. Oil is supplied to each nozzle through ball check valves and is piped to a spring-loaded diaphragm in the protective trip block. If excessive thrust bearing wear should occur, the thrust bearing collar will move toward one of the nozzles and the back-pressure in the line will increase. When this pressure rises to 35 psig, a pressure

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switch will close and sound an alarm in the Control Room. Should wear in the same direction continue, the pressure will continue to increase and, when it reaches 75 to 80 psig, the diaphragm will move up, raising the auto stop oil drain valve, releasing auto stop oil and allowing EHC high pressure trip fluid to drain, shutting down the turbine. Test TS-4A simulates this condition. However, holding the test handle in "TEST" prevents the auto-stop oil and EHC fluid from depressurizing and allows the turbine stop valves to remain open.

#### CAUSE

This event was caused by procedural non-compliance. However, several other contributing factors were identified:

1. Pertinent information was not communicated. While attempting to move the valve with the wrench, the individuals performing the test did not communicate to each other what their intentions were.
2. Self-checking was not applied to insure expected response throughout the entire evolution. Self-checking was utilized by the individuals assigned the task when they first reviewed the procedure and decided on the role each would fulfill while completing the procedure. Once they encountered the problem with the operation of the test valve, additional self-checking was not used.
3. There were too few workers assigned the task. The test procedure

being performed should have had three people; two to perform the test and one to supervise the work.

4. Direct supervisory involvement in the task interfered with the overview role. with the supervisor performing tasks associated with the procedure, he was not able to stand back, observe, and evaluate the overall conduct of the evolution.

5. The material condition of the valve. The valve handwheel was not securely fastened to the valve stem which allowed the handwheel to turn 1/4 turn with no stem movement.

## CORRECTIVE ACTIONS

### A. Immediate:

1. Test TS-4A was terminated.

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2. Operations personnel entered Emergency Operating Procedure EOP-0, "Reactor Trip or Safety Injection."

### B. Short Term:

1. Human Performance Enhancement System (HPES) Evaluation 93-06 was conducted to determine the cause and contributing factors to this event. The HPES concluded that the event was caused by procedural non-compliance.

2. Operations management placed an entry in the Operations Night Order Book which addresses the following items:

- o The importance of communicating each individual's intentions while performing a task.
- o The need for procedural compliance for the test associated with this event.
- o The importance of a task supervisor not getting actively involved as a worker in the performance of the task. A task which requires two people to perform the work does not include the supervisor acting as a worker.
- o A description of the valve design. The test valve stem and disk are one solid unit. When the stem moves, the disk

moves. The knurled handwheel screws onto the stem and is held in place by a set screw. It can become loose and turn without the valve stem moving. Valves found in this condition should be promptly repaired.

3. The valve handwheel was inspected. Its connection to the valve stem was tightened, and its set screw was adjusted.

4. The crew which was directly involved in this event performed a critique of the event at the end of their shift cycle.

5. This event will be reviewed by all NPD Training Advisory Committees to assess the need for training for NPD personnel by July 30, 1993.

#### C. Long Term:

1. The Production Planning Group will evaluate Procedure PBNP 3.1.5, "Outage Planning, Scheduling and Management," for adequacy with respect to scheduling work on the operating unit while the other unit is shut down. This evaluation will be completed by August 1, 1993.

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2. Continuing efforts will be made with respect to long range planning to limit the overlap when KNPP and one PBNP unit are concurrently shut down.

3. Test Valves 1&2EH-00048, 1&2EH-00049, 1&2EH-00064, and 1&2EH-00065 will be disassembled and the valve disk and seat inspected to determine if further action is required. This will be completed prior to the conclusion of outage U1R20 for the Unit 1 test valves and during outage U2R19 in the fall of 1993 for the Unit 2 test valves.

#### REPORTABILITY

This event is being reported under the requirements of 10 CFR 50.73(a) (2) (iv), "The licensee shall report... any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)." A 4-hour NRC ENS notification was made in accordance with 10 CFR 50.72 (b) (2) (ii). The NRC Resident Inspector was also notified.

#### SAFETY ASSESSMENT

All systems functioned as designed during this event. The safety of the plant and the health and safety of the public and plant employees were not jeopardized. However, this event did impact the operation of the PBNP electrical distribution system. When Unit 2 experienced the reactor trip, Unit 1 had been shut down for its annual refueling outage and the KNPP, located five miles north of PBNP, was shut down for its annual refueling outage. As a result of the three large generating units being shut down, a reduced grid voltage condition was created. Shift operating personnel began monitoring grid voltage and steps were taken to improve the situation. However, at no time were automatic protection features challenged or manual protection actions required.

This event heightened our awareness of the sensitivity of surveillance testing which could result in a unit trip under similar circumstances. As a result, we requested NRC enforcement discretion to allow a one time, 30-day extension to monthly surveillance tests for certain reactor protection and engineered safeguards system instrumentation. The surveillance tests would be performed within two weeks of the return to full power of either KNPP or PBNP Unit 1 following their annual maintenance and refueling outages, but no later than May 13, 1993. This request was formally approved by the NRC Office of Nuclear Reactor Regulation (NRR) on April 15, 1993.

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#### GENERIC IMPLICATIONS

No generic implications have been identified.

#### SIMILAR OCCURRENCES

The following LERs report events caused by procedural non-compliance:

LER Number	Report Date	Title
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266/91-004-01	09/16/91	Primary Temperature >200 degrees F Without Containment Integrity
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266/91-007-00	07/26/91	Fire Barrier Inadvertently Disabled
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266/91-012-01	11/27/91	Nuclear Instrumentation Turbine Runback
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